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BRIEFER ARTICLES.

WALNUT BACTERIOSIS.

I CHARACTERIZE here briefly a new micro-organism pathogenic to *Juglans regia* and related species, which has been under investigation at this laboratory for several years. Announcements of the isolation of the organism and a demonstration of its pathogenic action on walnuts were contributed several years since to the leading horticultural journals of the Pacific coast. Further communications relative to this disease are in course of preparation, which will enter more fully into the characterization of the organism, its pathogenic powers, its cultural peculiarities, and will give full details as to the nature and treatment of the disease which it causes.

Pseudomonas juglandis, n. sp.—A short, rod-shaped micro-organism with rounded ends, actively motile, bearing a single long polar usually wavy flagellum. Length of organism, taken from colony in acid gelatin, set directly from walnut, and stained with gentian violet, $1-2\mu$, according to whether the germ has just divided or has elongated but not yet divided. Just before separation a pair of germs will usually average about 2μ in length. Average breadth of organism about 0.5μ . Occurs singly or in pairs, and sometimes in shorter or longer chains. Produces a bright chrome yellow growth on potato and many other media. When growing normally on potato the starch is so acted upon by a diastatic ferment produced by the organism, that it is altered throughout a wide band beyond the margin of the culture of organisms. This band of converted starch may extend $0.5-1\text{cm}$ or more beyond the margin of the growth or germs, appears white to the eye, fails to show normal starch reaction to iodine, yields marked grape sugar reactions, has an exceedingly sharp and well defined limiting outline, often passing so sharply through a cell as to include only the starch grains on one side of the cell. This broad and distinct ferment band distinguishes this organism at once from *Pseudomonas Stewarti* and *P. hyacinthi*, as well as from the more nearly related *P. campestris*, which occasionally forms a weak but much narrower band, and from

all other unflagellate organisms studied. Organism prefers neutral or acid reaction of culture medium, a moderate degree of alkalinity inhibiting growth; it liquefies neutral and acid gelatin. Produces no gas in fermentation tubes of sugar solutions; growth confined to neck and bulb of tube, hence aerobic, no growth under mica plate. Colonies in malic acid potato gelatin and agar circular; at first clear but soon decidedly yellow, margin sharp. This organism is distinguished from *P. campestris*, the most nearly related species of the genus, aside from the characters already assigned, in producing an abundant and bright yellow pigment on the surface of extracts of the leaves of the following plants, while *P. campestris* produces little or no pigment upon such extracts: walnut (*Juglans regia*), magnolia (*Magnolia macrophylla*), fig (*Ficus Carica*), castor bean (*Ricinus communis*), loquat (*Eriobotrya Japonica*).

Organism strikingly pathogenic to nuts, leaves, and tender branches of *Juglans regia*. In the young walnuts the epicarp and forming shell and kernel are destroyed, in the older nuts the epicarp alone may be affected. The leaves are commonly attacked along the veins and on the petiole, the organism often entering the vessels. The branches become infected near the growing point, and all tissue systems are destroyed, the organism entering and wintering in the pith cavity; it also winters in fallen nuts. An unlimited number of infections may be induced—and thousands have been so induced—by spraying the young nuts with a pure water culture of the organism. This test shows the germ to be one of the most active, self-effective parasitic or pathogenic species of the genus yet known to infect plants.

Pseudomonas campestris has not been found infesting the cabbage fields of the regions where the present disease prevails. Walnut bacteriosis is known to exist over large areas in southern California and to a limited extent in the central and northern portions of the state.—NEWTON B. PIERCE, *U. S. Dept. Agric., Div. Veg. Phys. and Path., Pacific Coast Laboratory, Santa Ana, Cal.*